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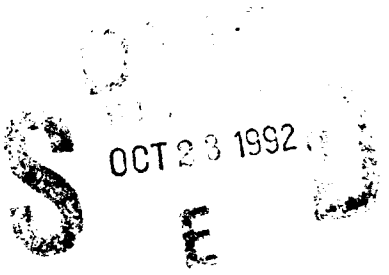


The Honorable John Conyers, Jr.
Chairman, Legislation and National
Security Subcommittee
Committee on Government Operations
House of Representatives

Dear Mr. Chairman:

As you requested, we are reviewing the $2.7 billion Short-Range Unmanned Aerial Vehicle (UAV) program to determine whether it represents a valid joint-service effort that will minimize duplication among UAV programs and whether test results justify the imminent commitment to system production. This interim report focuses only on the system's readiness for production. Our in-depth evaluation is expected to be completed early next year and will focus on the detailed results of system testing as well as the joint-service aspects of the program.

Background

UAVs are pilotless aircraft resembling small airplanes or helicopters that are remotely controlled or preprogrammed to be controlled by on-board equipment. (See fig. 1.) The Department of Defense (DOD) initiated acquisition of the Short-Range UAV in fiscal year 1989 as a common-service system for use by the Army, Navy, and Marine Corps. The system is one of a family of UAVs being acquired by DOD to provide the capability to perform reconnaissance, surveillance, target acquisition, and intelligence collection.

The UAV Joint Project Office (JPO), which manages acquisition of the Short-Range system, awarded contracts in September 1989 to two firms to provide candidate systems for competitive testing in fiscal year 1991. However, technical problems with the candidate systems delayed the program, and the competition continued into fiscal year 1992. In June 1992, one firm was unable to complete the competitive testing because it could not successfully certify military users to safely operate its system. The other firm completed the test program in July 1992 and was selected as the winning contractor.

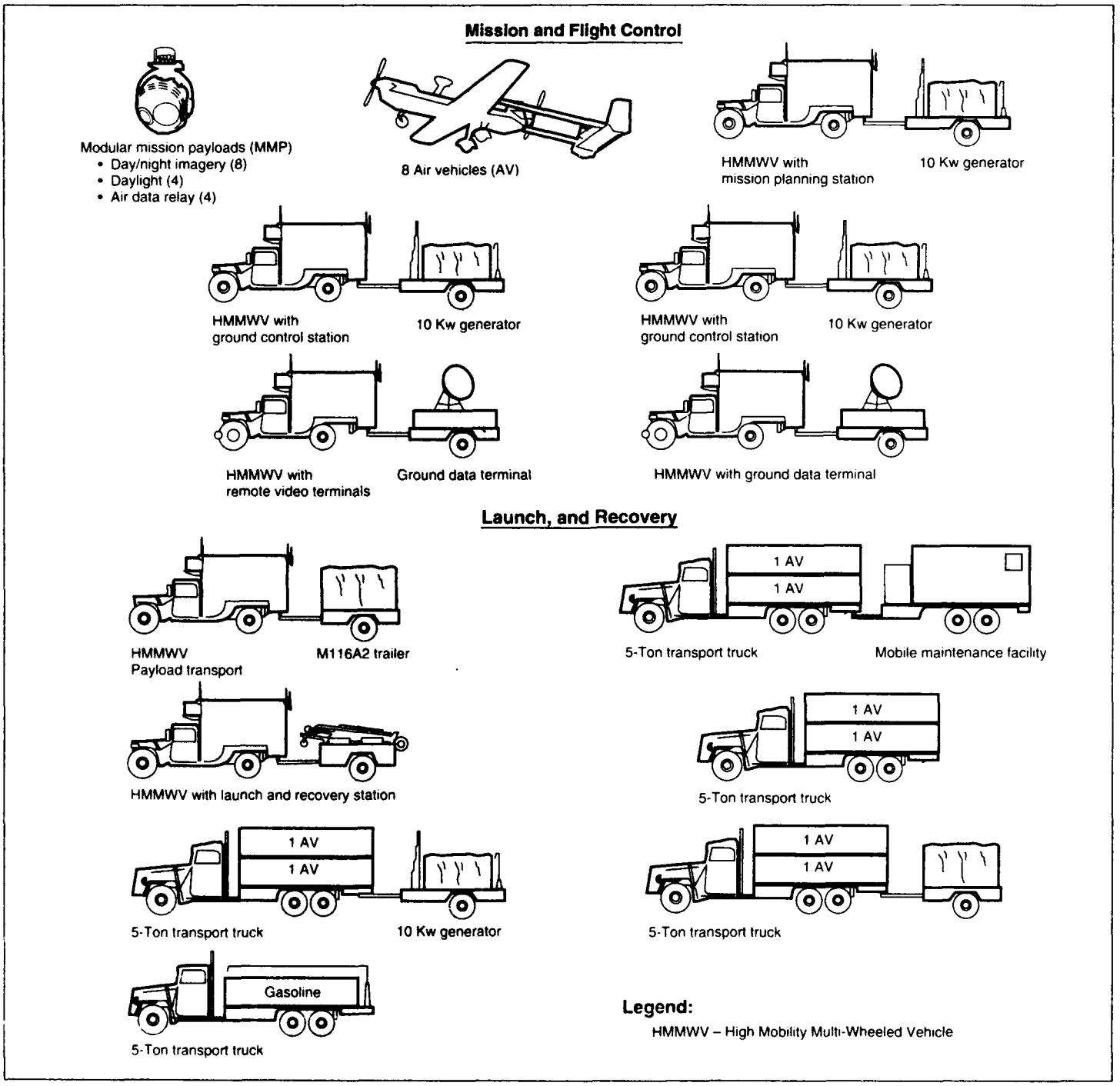
Figure 1: Short Range UAV

Source: U S Army

The test program included both technical testing and other testing referred to as "limited user tests." The technical testing, during which the systems were operated by contractor personnel, was conducted under the direction of the JPO. Test objectives included determining the technical performance capabilities of the systems and verifying their readiness to enter the limited user testing. The objective of the limited user testing was to determine the ability of the systems to satisfy user requirements. During limited user testing, the remaining system was operated by Army and Marine Corps personnel, and the tests were conducted by operational test agencies of the services. DOD had not completed its analysis of the test results at the end of our work.

Under the 1989 contract, the JPO can exercise a contract option for production of four to eight systems. The Defense Acquisition Board is scheduled to meet on September 28, 1992, to decide whether to approve exercising the option. Program officials stated they plan to procure only four systems under this option. Each system is to include eight air vehicles with payloads, a launch and recovery system, ground stations for controlling the UAV's flight and processing information from the UAV, and related equipment such as trucks to transport system components. (See fig. 2.)

Figure 2: Short Range UAV System Description



The JPO plans to procure a total of 48 systems: 31 for the Army, 14 for the Marine Corps, and 3 for training. The Navy is no longer participating in the program. System deployment is scheduled to begin in late 1994.

Results in Brief

Our evaluation of the Short-Range UAV program indicates that the system has not demonstrated its readiness for production. Contrary to its previous plans to perform operational testing before limited production, DOD now plans to start production based on limited testing that did not adequately address several critical system performance capabilities. Moreover, the testing was conducted in an environment not representative of where the system is to be deployed and therefore could be misleading. In addition, adequate criteria was not established to evaluate the system's performance. Thus, DOD will be committing to the acquisition of a largely unproven system if production is started as now scheduled.

Deferral of Operational Testing Increases Program Risk

During a previous review of the Short-Range program,[1] we expressed the concern that DOD planned to start low-rate production before subjecting the system to operational testing. However, during that review, DOD revised its acquisition strategy to provide for completing one phase of operational testing before system production.

Since then, because of technical problems encountered with the competing contractor systems, the JPO deferred operational testing from April 1991 to March 1994 but did not slip the production schedule accordingly. Under the current contract, the JPO plans to exercise two system production options, one in September 1992 and the other in September 1993, before operational testing.

JPO officials stated that they plan to procure only 7 systems under the two options. However, the contract provides that the JPO can procure up to 20 UAV systems, or 42 percent of the total program quantity, before initial operational testing is performed. Although DOD policy permits low-rate production to provide systems for operational testing, none of the UAV systems to be procured are actually needed to perform operational testing. According to test officials, only two systems are required, and they are already available. By awarding two production contracts before operational testing, DOD will prematurely commit to production of an unproven system.

[1]Unmanned Aerial Vehicles: Realistic Testing Needed Before Production of Short-Range System (GAO/NSIAD-90-234, Sept. 28, 1990).

We recognize that DOD policy does not require operational testing prior to low-rate production. However, our past work has shown that beginning production before operational testing is performed can result in adverse consequences. For example, we reported in 1987[2] that beginning production before operational testing had resulted in the purchase of electronic warfare equipment that could not be used for its intended purpose. We also reported that other electronic warfare systems were placed in bonded storage rather than installed in aircraft, while other systems were deployed to U.S. combat forces despite being judged operationally unsuitable by DOD testing officials. Furthermore, our work on other systems, such as the Airborne Self-Protection Jammer, has also shown that once production begins, the desire to prevent a production break can overrule any subsequent test results.[3]

Limited User Testing Did Not Adequately Address Critical Performance Issues

Because of limited preproduction testing, significant uncertainty will exist about the Short-Range UAV's performance if the initial production option is awarded as scheduled. Experience with UAVs during Operation Desert Storm demonstrated the importance of several performance issues such as the capability to launch and recover UAVs in a combat environment. Yet, the Short-Range system's limited user testing did not address or provided only limited information on these and other important system capabilities.

Launch and Recovery Testing Was Unrealistic

To avoid the need for constructing runways in a fluid combat environment, the stated requirements for the Short-Range UAV specify that the system must be capable of operating from an unimproved flat grass or dirt surface measuring 200 meters by 75 meters. Moreover, UAV operations during Operation Desert Storm showed that the need for a hard surfaced runway is a severe operational constraint requiring considerable expenditure of resources.

Nevertheless, two runways with improved surfaces were used during the Short-Range system's limited user testing. (See fig. 3.) While unpaved, both were graded and packed by heavy road construction equipment. No operations were conducted from unimproved areas.

[2]Electronic Warfare: Navy/Air Force Still Developing Separate, Costly Radar Warning Receivers (GAO/NSIAD-87-167, July 1, 1987).

[3]Electronic Warfare: Established Criteria Not Met for Airborne Self-Protection Jammer Production (GAO/NSIAD-92-103, Mar. 23, 1992).

Figure 3: Improved Runway at UAV Test Site

The JPO Director acknowledged that the runways were improved surfaces but stated that using engineering battalions in combat to construct runways would meet requirements. However, during Desert Storm the Army found that rather than using scarce engineering equipment to hurriedly construct UAV airfields in a combat environment, it needed a UAV system that could operate from unimproved surfaces. Whether the Short-Range system will fulfill this need is uncertain; no tests were done to determine whether the system could meet the stated requirement.

Electromagnetic Compatibility Testing Omitted

Electromagnetic compatibility refers to the capability of electric or electronic systems to operate in their intended environments without causing or suffering from interference with other systems, and DOD policy requires that systems be designed to have this capability.

The importance of electromagnetic compatibility was underscored during Operation Desert Storm. The JPO attributed the loss of two Pioneer UAVs and severe damage to two others to electromagnetic interference. Additional instances of electromagnetic interference caused by emissions from microwave towers and other systems also resulted in temporary loss of control of the air vehicle and prevented imagery from the vehicles payload from being transmitted to the ground control station.

Nevertheless, the Short-Range UAV's limited user tests conducted prior to limited production did not address this issue. In fact, to avoid any potential interference problems, test officials took steps to ensure that the test area was free from electromagnetic interference.

UAV Survivability Not Evaluated

DOD policy designates system survivability as a critical system characteristic and provides that it will be an essential consideration during the acquisition of systems. The policy also provides that developers and test agencies will assess system survivability and critical survivability characteristics as early as practical. Threats to be considered include conventional weapons, such as anti-aircraft weapons, and advanced threats, such as high-power microwave and directed-energy weapons.

Nevertheless, survivability of the Short-Range UAV was not addressed during limited user testing. In fact, DOD has not established any survivability requirements for the system despite its stated policy.

Although data were collected pertaining to survivability, such as the capability of threat weapons to engage the UAV, the data were not evaluated and are not to be considered in making the production decision. The JPO plans to address the system's survivability through an upgrade program to be implemented in 1994, after award of the first two production options.

System Reliability Not Evaluated

UAV reliability was one of the main concerns stemming from Operation Desert Storm. Nevertheless, the reliability of the Short-Range UAV was not evaluated during limited user testing. Although limited reliability data were gathered during limited user testing, no reliability requirements have been established that the system must meet to enter low-rate production. Consideration of system reliability as a performance requirement will not occur until the full-rate production decision.

System Maintenance Performed by Contractor

Operation Desert Storm revealed problems in maintaining the Pioneer system even though the maintenance was performed by contractor technicians. Although DOD plans for the Short-Range UAV to be maintained by military personnel, contractor technicians maintained the system during limited user testing. Testing of the capability of military personnel to maintain the system will not occur until after production begins. Thus, DOD plans to begin production without demonstrating that military personnel will be able to maintain the Short-Range UAV adequately to support sustained operations.

System Endurance Requirement Not Fully Tested

The stated endurance requirements for the Short-Range UAV system specify that it must be capable of providing surveillance of a target or search area for a minimum time period on successive days. (The specific time period is classified.) However, only 1 of the Short-Range system's 10 test flights was of sufficient duration to measure against the minimum time period. No attempt was made to determine whether the system can meet this requirement on successive days. Thus, the capability to meet the endurance requirement is uncertain.

Preproduction Testing in Unrealistic Environment Further Compounds Performance Uncertainties

Testing in a realistic environment representing combat conditions is DOD's primary means for predicting weapon system performance. However, based on deployment plans for the Short-Range system, the limited user testing was not done in a realistic environment. Therefore, the test results may not be a valid indicator of the system's capability.

Realistic testing of the Short-Range system would require that it be tested at locations resembling those where it might be used in combat. According to its deployment plan, the system is required to operate in areas marked by hilly or mountainous terrain with dense forests and other vegetation and by varied climatic conditions such as cloudy weather, rain, snow, and other factors. Thus, the system is supposed to be capable of performing its mission under a variety of environmental conditions.

However, the Short-Range system's limited user testing was done only in a desert environment. The test facility, located at Fort Huachuca, Arizona, is typical desert terrain for the most part with only sparse vegetation. (See fig. 4.) Under these test conditions, targets did not seem difficult to detect. We viewed the test area from a helicopter, including the targets that the Short-Range system was supposed to identify during the test program. We had little or no difficulty in readily identifying the targets, which included

artillery weapons, surface-to-air missiles and associated radars, and similar weapons. Thus, the testing done to date does not address the system's ability to find targets under a variety of environmental conditions.

Figure 4: UAV Test Range

We reported on this issue in 1990 and recommended that the Secretary of Defense require that operational testing of the Short-Range UAV be conducted in diverse, realistic environments to provide reasonable assurance that it would meet requirements before permitting limited production. DOD disagreed, stating that an adequate evaluation of the system's capability could be accomplished without testi .g in all environments in which the system might be deployed. Nevertheless, DOD indicated that it was in the process of identifying an additional test site,

with environmental conditions different from those at Fort Huachuca, for operational testing to be done after the production decision.

At that time, DOD also pointed out that the tests were scheduled to occur during Fort Huachuca's rainy season during which low-hanging clouds and periods of intense rain could be expected. However, Army test officials informed us that rain occurred during only one of the Short-Range system's flight tests. The officials told us there was a brief period of heavy rainfall on the Ft. Huachuca test range on the one day that rain occurred. They said that the operators maintained control of the system during the rain but that the system was unable to locate any targets. According to data provided by the Ft. Huachuca Meteorological Station, the total rainfall at Ft. Huachuca measured one one-hundredth of an inch during June and July 1992 when the Short-Range system's flight test were held.

Adequate Criteria Were Not Established

The operational test agencies that conducted the test could not fully evaluate most of the test results. For 81 of 97 measures of performance established for the test, the operational test agencies only gathered the related test data because no performance criteria were established for evaluation purposes.

For example, one of the measures of performance was the percentage of targets that the Short-Range UAV could recognize during the flight tests. The test agencies gathered the results on this measure of performance but did no evaluation because no criteria or threshold had been established to indicate how often the system was supposed to be able to recognize targets. This absence of criteria effectively prevented the operational test agency from fully performing the independent evaluation of system performance that is normally done and, in our view, further compounds the uncertainty about the Short-Range system's performance.

Recommendation

We recommend that the Secretary of Defense require that limited production be deferred until realistic operational testing provides reasonable assurance that the system will perform satisfactorily.

Agency Comments

We did not obtain official agency comments on this report. However, we discussed its contents with DOD, Joint Project Office, and Army Project Office officials and have incorporated their comments where appropriate.

From an overall standpoint, JPO officials disagreed with the central message of this report—that the Short-Range UAV has not been tested sufficiently to warrant a commitment to its production. They maintained that the system had been thoroughly tested and cited in particular the technical testing as having been a comprehensive evaluation of the system's performance.

While the technical testing was extensive, we do not agree that it should be the basis for a production commitment. The technical testing was essentially developmental testing to determine whether the system met technical performance specifications. The testing was not intended to evaluate the system's potential operational effectiveness or suitability, which is the function of operational test and evaluation. We believe that DOD should have reasonable assurance, based on operational test and evaluation, that the Short-Range UAV will be operationally effective and suitable before committing to its production.

In our evaluation, we focused on the limited user tests because they more closely approximated operational tests. Even so, these tests do not qualify as operational tests. For example, the system was maintained by contractor technicians during the tests rather than by military personnel. Because the Short-Range system is to be maintained by military personnel when deployed, use of contractor technicians detracted from the realism of the tests.

Scope and Methodology

To accomplish our objective, we examined test schedules, test plans, performance requirement documents, acquisition plans, and other records bearing on the Short-Range UAV's status and potential effectiveness. We focused primarily on the plans for limited user tests because they were conducted by operational test agencies of the military services using military personnel to operate the system. We also examined DOD policies and regulations which addressed testing and evaluation of the Short-Range program and discussed the system with responsible Department of Defense, Joint Project Office, and Army UAV Project Office officials.

We performed our work primarily at the Office of the Secretary of Defense; Department of the Navy, Program Executive Office for Cruise Missiles and

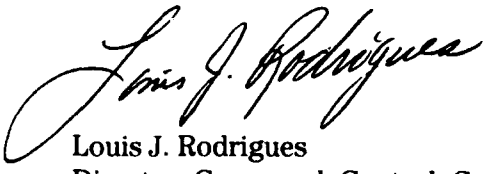
UAV Joint Project; Army Missile Command, UAV Program Office; Army Operational Test and Evaluation Command; Electronic Proving Ground; and the Defense Director of Operational Test and Evaluation.

We performed our review from December 1991 to August 1992 in accordance with generally accepted government auditing standards.

Unless you publicly announce its contents earlier, we plan no further distribution of this report until 5 days from its issue. At that time, we will send copies to other interested congressional committees; the Secretaries of Defense, the Army, and the Navy; the Director, Office of Management and Budget; and other interested parties. We will make copies available to others upon request.

Please contact me at (202) 275-4841 if you or your staff have any questions concerning this report. Major contributors to this report were Jackie B. Guin, Assistant Director; Pamlutricia Greenleaf, Evaluator-in-Charge; and John S. Warren Jr., Evaluator; Atlanta Regional Office; and Charles A. Ward, Evaluator.

Sincerely yours,



Louis J. Rodrigues
Director, Command, Control, Communications,
and Intelligence Issues